Space Weather Forecast

Issued on Sunday, 24 March 2024 at 13:21 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

---

Space Weather Forecast Headline: Further Minor/Moderate radio blackouts (R1/R2) expected. Current S2 conditions only slowly reducing. Minor to Moderate geomagnetic storms (G1-G2) expected into days 1 and 2 (24-25 Mar) given likely CME arrival and ongoing fast solar winds, with a chance of Strong geomagnetic storm (G3) intervals.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity rose to become High, with a strong flare from a broad region in the north disk at 23/0133UTC. The large sunspot region approaching centre disk produced 4 Moderate flares over the past 24 hours, the highest being an M5.1 at 23/1352. There are now six sunspots on the visible disc, with a small region emerging in the northwest quadrant recently numbered. The region approaching centre disk remains by far the largest and most complex group on the disc, now showing top tier complexity, having undergone significant growth across the region, as well as a later spreading trend. Changes in other groups were minor by comparison.

The main activity observed on coronagraphs in the period was a large and complex Coronal Mass Ejection (CME) associated with the strong flare. This event was clearly visible in all imagery. Provisional modelling of this CME suggest a likely impact with Earth late on the 24th or early on the 25th of March.

Solar Wind / Geomagnetic Activity: The solar wind was initially at background levels but steadily rose after 23/1200UTC as earth came into contact with the HSS (High Speed Stream) in association with a coronal hole and are currently just about at elevated levels at 500km/s. The IMF saw a change from initial weak positive values giving way to weak to moderate broadly negative values which slowly rotate weakly positive again towards midday before becoming moderate to strong largely negative values, peaking at -14nT at 23/2012UTC.

The net result of the above solar wind measures was Unsettled to Active activity with a Moderate geomagnetic storm (Kp6) at 24/0000UTC.

Energetic Particles / Solar Radiation: Solar radiation rose following the strong flare to rise above S1 levels from 23/0815UTC and above S2 levels at 23/1400UTC and remains elevated although has been on a gradual decline since 23/1800UTC.

Four-Day Space Weather Forecast Summary
Solar Activity: Moderate to High activity is expected, with further Moderate flares expected from primarily the large and highly active region near centre disk (AR3615) through the forecast period, with a chance of isolated Strong flares.

Solar Wind / Geomagnetic Activity: There is one Earth-directed CMEs in the current forecast, this is associated with the strong flare from a broad region of the northern disk at 23/0133UTC. This produces a complex coronal mass ejection (CME) modelled to arrive later on day 1 (24

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

© Crown Copyright 2024. All Rights Reserved.

Mar) or early day 2 (25 Mar), with winds perhaps increasing to 600-700km/s before slowly declining. The other notable enhancement is from the continuing connection to a fast solar wind, with current elevated solar winds (500-550km/s) expected to ease through day 3 (26 Mar), perhaps returning to background levels by day 4 (27 Mar) in the absence of CME influence.

Initially Unsettled to Active geomagnetic activity is expected to give way to G1-G2 minor to moderate storm intervals later day 1 (24 Mar) given the expected arrival of the above CME, with a chance of G3 strong geomagnetic storm intervals. These conditions expected to continue into day 2 (25 Mar) as the influence of the CME likely continues, before being expected to generally ease into day 3 (26 Mar), becoming Unsettled to Active with a slight chance of residual G1-G2 intervals. Into day 4 (27 Mar) a return to generally Quiet to Unsettled conditions expected given likely waning HHS influence in the absence of further CME enhancement.

Energetic Particles / Solar Radiation: Solar radiation is currently above S2 thresholds following recent strong flare activity, and is expected to remain so through days 1 and 2 (24-25 Mar) with the ongoing fast solar wind and likely approaching CME acting to maintain the enhancement. There is a slight chance that CME influence may see solar radiation breach the S3 threshold. Radiation levels are thought likely to fall to S1 levels later day 2 into day 3 (25-26 Mar), before perhaps slowly falling back to background levels during day 4 (27 Mar) although confidence is low with the large sunspot region near centre disk presenting an increasing risk of further enhancement.

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

© Crown Copyright 2024. All Rights Reserved.

Met Office Space Weather Forecast

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	Yes	80	80	20	5
Strong	G3	No	30	30	1	1
Severe	G4	No	5	5	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	90	90	90	90
Very Active	R3 to R5 X	No	30	30	30	30

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	Yes	100	90	70	30
Very Active	≥ S3 *	No	10	10	5	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

© Crown Copyright 2024. All Rights Reserved.